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ABSTRACT

This study investigated the efficacy of noncognitive variables for predicting college student achievement in an introductory psychology course. The sample included 102 new first-year students at a private urban university and 233 new first-year students at a rural public university. Data were collected on self-ratings of overall academic ability, drive to achieve, mathematical ability, self-confidence in intellectual ability, expectations of making at least a "B" average in college, expectations of graduating with honors, American College Test (ACT) composite scores, the number of years of high school mathematics completed, and the course grade. The study found that professional behavior: rational use of knowledge; personal directed interaction with people; operationally obtaining some results; and fulfilling conditions by provision with means. This self-confidence in intellectual ability were significantly correlated with subsequent psychology course grades among the students from the private urban university but not for students at the rural public university. (Contains 21 references.) (MDM)

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ED 390 321

Noncognitive Predictors of Achievement in a General Education Course: A Multi-Institutional Study

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Abstract

The purpose of this study was to investigate the efficacy of non-cognitive variables for predicting student achievement in a general education course. In this study, there were 335 students who enrolled at two institutions during the same fall semester and subsequently took an introductory psychology course during the freshmen year. Several noncognitive variables were found to be significant predictors of course performance. In addition, academic background variables were also significantly related to achievement. Some differences between the two institutions for the relationship between noncognitive variables and course performance were noted. These findings suggest that noncognitive variables should be given consideration by institutional researchers when investigating student achievement.

The importance of student characteristics such as interests, attitudes, and motivation (sometimes referred to as noncognitive variables) as predictors of student achievement has been discussed (Messick, 1979). A number of studies have examined the relationship between noncognitive variables and several measures of academic performance. Noncognitive variables have been found to be significant predictors of the overall grade performance of college students (Gerardi, 1990; House, 1994), grades in specific courses (House, 1995; Wilhite, 1990), and exam grades (Gordon, 1989). In addition, noncognitive variables are significant predictors of college attrition (House, 1992; Tracey & Sedlacek, 1987). Further, student attitudes have been reported to be significant predictors of the selection of specific major fields of study, such as mathematics or science (Hackett & Betz, 1989). Further research, however, is needed to investigate the relative contributions of both traditional measures (such as admissions test scores and high school performance) and noncognitive variables as predictors of achievement outcomes of college students. In addition, research is needed to examine those relationships for a variety of types of academic outcomes.

Recent research has examined the efficacy of several aspects of academic self-concept and specific achievement expectancies as predictors of student performance in a general education chemistry course (House, 1993). In addition, the effects of prior achievement (measured by ACT Composite scores) and prior instructional experience (the number of years of high school mathematics taken) were also considered. The results of that study indicated that two noncognitive measures, self-ratings of mathematical ability and of overall academic ability, were the only variables to significantly enter a

multiple regression analysis of grade performance in introductory college chemistry. However, when the criterion measure was whether or not students had passed the course, the number of years of high school mathematics taken and expectations of graduating with honors were the only two variables to significantly enter a logistic regression analysis. These results suggest that noncognitive variables are significant predictors of performance in a college general education course. Further research, however,is needed to determine if the same set of predictor variables (noncognitive measures, prior achievement, and previous instructional experience) are predictive of student performance in other types of college courses.

One characteristic of most studies that examine college student achievement is that students at only one institution are included. Multi-institution studies are needed, however, to assess the generalizability of such findings. Previous multi-institution studies have been conducted for admissions tests. Rubin (1980) conducted an analysis of the validity of the Law School Aptitude Test (LSAT) at 82 law schools while Zwick (1993) evalauted the predictive validity of the Graduate Management Admission Test (GMAT) for students in doctoral programs in business and management at 36 universities. Considerably fewer studies have evaluated the efficacy of noncognitive variables as predictors of student achievement in multi-institution studies and, in most instances, those studies have evaluated college attrition as the criterion measure (Ethington, 1990; Pavel & Padilla, 1993). Consequently, further multi-institution research is needed to evaluate the relationship between noncognitive variables and college course performance.

The purpose of this study was to evaluate the efficacy of

noncognitive variables as predictors of student achievement in a college general education psychology course. This study was intended to build upon previous research in two ways. First, this study was designed to extend the findings of House (1993) by focusing on student achievement in a general education course commonly taken during the first year of college. Second, this study was designed to include students from more than one institution, thereby enhancing the generalizability of the results of this study.

Methods

Students

The students included in this study were a sample of 335 students who began college during the same fall semester and took an introductory psychology course during their first year. Of this sample, 102 students were enrolled at Institution A (a private urban university) and 233 were enrolled at Institution B (a rural public university).

Measures

During orientation periods held on each campus prior to the start of the fall semester of their freshmen year, students were requested to complete a survey that assessed students' attitudes and their achievement expectancies (CIRP, 1987). For use in this study, four items that measured academic self-concept were selected: self-ratings of overall academic ability, drive to achieve, mathematical ability, and self-confidence in intellectual ability. On these items, students indicated themselves to be: (a) lowest ten percent, (b) below average, (c) average, (d) above average, and (e) highest ten percent. Two items that measured specific achievement expectancies were also selected for use in this study: expectations of making at least a B average in college and of

graduating with honors. For these items, students estimated their probability of these outcomes as: (a) no chance, (b) little chance, (c) some chance, and (d) very good chance. In addition, two other predictors variables were included in this study: ACT Composite scores and the number of years of high school mathematics taken by each student. Finally, the dependent measure examined in this study was the grade earned in a general education course (introductory psychology) taken during the first year of college.

Procedure

The data from this study were analyzed in several ways. First, correlation coefficients were computed to determine the relationships between each predictor variable and subsequent grade performance. Second, least-squares multiple regression analyses were used to determine the relative ordering of each predictor variable toward the explanation of psychology course grade performance. Finally, stepwise logistic regression analyses were conducted to investigate the relationships between each predictor variable and whether or not students earned a satisfactory grade in the course. Logistic regression is particularly suited to the analysis of binary outcomes such as passed/failed (O'Gorman & Woolson, 1991). In logistic regression, the relationship between a binary outcome measure and a set of predictor variables (either categorical or continuous) is examined. Because it is a stepwise procedure, logistic regression provides an analysis of the relative ordering of each predictor variable toward the explanation of the outcome measure (Afifi, 1990). For this study, each analysis (correlation coefficients, ordinary least-squares multiple regression, and logistic regression was done separately for students at each university as well as for the entire sample.

Results

Correlations between each of the predictor variables are presented in Table 1. In Table 1, correlations for the entire sample are presented as well as for students at both institutions. A considerable number of significant correlations between predictor variables were obtained. Considering institution A, self-ratings of overall academic ability, self-confidence in intellectual ability, and expectations of making at least a B average in college and of graduating with honors were significantly correlated with ACT Composite scores. Students' self-ratings of their overall academic ability and mathematical ability were significantly correlated with the number of years of high school mathematics taken. Interestingly, there was not a significant correlation between the number of years of high school mathematics taken and ACT Composite scores.

Considering students at institution B, five of the six non-cognitive variables were significantly correlated with ACT Composite scores; only the relationship between self-ratings of drive to achieve and ACT scores was not significant. Students' self-ratings of their overall academic ability, drive to achieve, and mathematical ability were significantly correlated with the number of years of high school mathematics taken. Finally, in contrast to institution A, there was a significant correlation between the number of years of high school mathematics taken and ACT Composite scores for students at institution B.

When the entire sample was examined, it was found that all six noncognitive measures were significantly correlated with ACT Composite scores. Three academic self-concept measures (self-ratings of overall academic ability, drive to achieve, and mathematical ability) were significantly correlated with the number of years of

high school mathematics taken. Finally, there was a significant relationship between the number of years of high school mathematics taken and ACT Composite scores.

Results from the correlation analysis of the relationships between predictor variables and grade performance are summarized in Table 2. Findings from those correlation analyses indicate that, for students at both institutions, several noncognitive variables were significantly correlated with course performance. Self-ratings of overall academic ability and expectations of making at least a B average in college were significant predictors of course performance for students at both universities. Students' ratings of their self-confidence in their intellectual ability were significantly correlated with subsequent psychology course grades at university A, but not for students at university B. Conversely, self-ratings of drive to achieve were significant predictors of grade performance for students at university B but not for students at university A; a similar pattern was also noted for the relationship between the number of years of high school mathematics taken and psychology course grades. Finally, ACT Composite scores were significantly correlated with psychology course grades for students at both institutions.

When the correlations for the entire sample were considered, seven of the eight predictor variables were significantly correlated with subsequent psychology course grades. ACT Composite scores showed the most significant simple correlation. The correlations obtained indicated that students who earned higher course grades tended to have higher self-ratings of their academic ability, of their drive to achieve, and their mathematical ability. Moreover, students who earned higher course grades tended to have higher

expectations of earning at least a B average in college and of graduating with honors. Finally, students who had taken more years of high school mathematics and who had higher ACT Composite scores tended to earn higher grades in their introductory psychology course.

Findings from the multiple regression analysis of course grades are presented in Table 3. For students at institution A, results from the multiple regression analysis indicated that a noncognitive variable (expectations of making at least a B average in college) entered the regression equation first as the most significant predictor variable; ACT Composite scores entered the regression equation second and also explained a significant proportion of the remaining variance in grade performance. None of the remaining predictor variables significantly entered the regression equation. Finally, the overall multiple regression equation was significant ($F(8,93) = 2.52$, $p = .0159$) and explained 17.8% of the variance in psychology course grades.

Results from the multiple regression analysis of course grades for students at institution B are also summarized in Table 3. For students at university B, ACT Composite scores entered the multiple regression equation first and explained a significant proportion (9.0%) of the variance in psychology course grades. The number of years of high school mathematics taken and a noncognitive variable (expectations of making at least a B average in college) also significantly entered the multiple regression equation. In addition, the overall regression equation was significant ($F(8,224) = 5.07$, $p = .0001$) and explained 15.3% of the variance in course grade performance.

Multiple regression results for the entire sample are presented in Table 3. ACT Composite scores entered the regression equation

first and explained a significant proportion (9.5%) of the variance in grade performance. Expectations of making at least a B average in college and the number of years of high school mathematics taken were the second and third variables to enter the regression equation and both were significant. None of the remaining noncognitive variables significantly entered the regression equation. Finally, the overall regression equation was significant ($F(8,328) = 6.83$, $p = .0001$) and explained 14.4% of the variance in introductory psychology course grades.

Results from the logistic regression analyses of whether or not students earned a satisfactory (A-C) vs. unsatisfactory (D-F) grade in their introductory psychology course are presented in Table 4. As can be seen, none of the predictor variables were significantly related to satisfactory/unsatisfactory grade status for students at institution A. However, expectations of making at least a B average in college entered the regression equation first and was near statistical significance. In addition, the number of years of high school mathematics taken entered the logistic regression equation second and was also near statistical significance. This finding is in contrast to the outcome when the criterion measure was overall grade performance; for students at institution A, the number of years of high school mathematics taken entered the multiple regression as the seventh of eight predictor variables when explaining overall grade performance but was near statistical significance in the logistic regression analysis of whether or not students earned a satisfactory grade in their psychology course. In addition, the logistic regression procedure provides an analysis of the joint significance of the explanatory variables. In this instance, the overall logistic regression equation for institution A

was not significant (χ^2 (8, N = 102) = 10.91, p = .2066).

Findings from the analysis of satisfactory/unsatisfactory grade status for students at institution B are also summarized in Table 4. The number of years of high school mathematics taken entered the logistic regression first and was significant. In addition, ACT Composite scores were near statistical significance. However, none of the noncognitive variables were significant. In contrast to the findings from institution A, the overall regression equation was significant (χ^2 (8, N = 233) = 19.41, p = .0128).

Results from the logistic regression analysis of satisfactory/unsatisfactory grade status for the combined sample are also presented in Table 4. The only predictor variable to significantly enter the regression equation was ACT Composite score. None of the noncognitive variables significantly entered the regression equation. This finding was consistent with the results of the analysis of overall grade performance; in each instance, ACT Composite score entered the regression equation first as the most significant predictor variable. Finally, the overall logistic regression equation was significant (χ^2 (8, N = 335) = 17.90, p = .0220).

Discussion

There were two main findings from this study. First, the results of this study indicate that students' noncognitive characteristics were significant predictors of their subsequent achievement in a general education (introductory psychology) course. When the entire sample was considered, five of the six noncognitive variables included in this study were significantly correlated with students' course grade performance. In addition, expectations of making at least a B average in college significantly entered the multiple

regression equation used to examine grade performance. A second finding of this study was that prior academic achievement (ACT Composite score) was the single significant predictor variables in a logistic regression analysis of whether or not students earned a satisfactory grade in their introductory psychology course. Consequently, noncognitive variables were more closely related to overall grade performance than with satisfactory/unsatisfactory grade status. This finding is consistent with previous results (House, 1993).

One strength of this study is that students from two universities were included, thereby enhancing the generalizability of these findings. Most studies that have evaluated the relationships between noncognitive variables and subsequent achievement outcomes have included students at a single institution (Gerardi, 1990; Gordon, 1989; House, 1992, 1993, 1995; Wilhite, 1990). Consequently, these results provide further insight into the efficacy of noncognitive variables as predictors of later academic performance for students at different types of institutions. A second strength of this study is that the same set of predictor variables used in previous research (House, 1993) were incorporated into the design of this project. This methodology allows a direct comparison of these findings with earlier results for students in a general education chemistry course (House, 1993). In both studies, several noncognitive measures were significantly related to course grade performance. In addition, measures of prior achievement (ACT Composite scores) and previous instructional experience (years of high school mathematics taken) were more significantly related to students' satisfactory/unsatisfactory grade status than were noncognitive variables.

There were several limitations of the present study. First, only traditional-aged students were included in this analysis. Recent research suggests that different factors may be related to the academic performance of adult students than for traditional-aged students (Ashar & Skenes, 1993). Other research has indicated that adult learners often have different educational objectives and employ different learning strategies than younger students (Ansello, 1982; Heimstra, 1980); in addition, it has been shown that instructors often employ teaching activities that address the specific goals and learning styles of their adult students (House & Burns, 1986). Consequently, further study is needed to determine if the relationships found in this study would also be evident for adult learners. A second limitation of this study is that insufficient numbers of minority students were in this sample to allow meaningful analyses to be made by student ethnic group. Previous research has found that the relationships between noncognitive variables and achievemen outcomes can vary as a function of student ethnic group (House, 1994). Additional research is needed to determine if noncognitive variables would prove to be significant predictors of the achievement of minority students in general education courses.

The results of this study indicate that noncognitive variables were significant predictors of student achievement in a general education course taken during the first year of college. These results suggest that noncognitive variables should be given consideration by institutional researchers when accounting for factors that predict academic success. These results also suggest that students' attitudes about their academic abilities and their expectancies for subsequent achievement in college should be considered when providing academic counseling during the freshmen year.

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Table 1

Intercorrelations Between Predictor Variables

Institution A	2	3	4	5	6	7	8
1. Self-Rating of Overall Academic Ability	.32**	.28**	.54**	.42**	.39**	.48**	.20*
2. Self-Rating of Drive to Achieve		.11	.53**	.31**	.30**	.18	.10
3. Self-Rating of Mathematical Ability			.03	.17	.16	.14	.48**
4. Self-Confidence in Intellectual Ability				.34**	.32**	.24*	.02
5. Expect to Graduate With Honors					.49**	.28**	.07
6. Expect to Make at Least a B Average						.21*	.07
7. ACT Composite Scores							.15
8. Years of High School Mathematics							---

Institution B	2	3	4	5	6	7	8
1. Self-Rating of Overall Academic Ability	.34**	.36**	.40**	.38**	.29**	.44**	.17**
2. Self-Rating of Drive to Achieve		.23**	.41**	.25**	.19**	.11	.14*
3. Self-Rating of Mathematical Ability			.17**	.19**	.12	.36**	.46**
4. Self-Confidence in Intellectual Ability				.29**	.22**	.21**	.07
5. Expect to Graduate With Honors					.40**	.26**	.00
6. Expect to Make at Least a B Average						.19**	-.07
7. ACT Composite Scores							.28**
8. Years of High School Mathematics							---

Table 1 (Continued)

Entire Sample	2	3	4	5	6	7	8
1. Self-Rating of Overall Academic Ability	.34**	.33**	.44**	.40**	.33**	.46**	.19**
2. Self-Rating of Drive to Achieve		.19**	.44**	.27**	.23**	.14**	.13*
3. Self-Rating of Mathematical Ability			.12*	.18**	.14*	.29**	.46**
4. Self-Confidence in Intellectual Ability				.29**	.25**	.21**	.05
5. Expect to Graduate With Honors					.43**	.28**	.02
6. Expect to Make at Least a B Average						.21**	-.02
7. ACT Composite Scores							.25**
8. Years of High School Mathematics							---

**p < .01, *p < .05.

Table 2

Correlations Between Predictor Variables and Grade Performance in College Psychology (Both Universities and the Combined Sample)

Predictor Variables	Univ. A	Univ. B	Combined Sample
Self-Rating of Overall Academic Ability	.272**	.191**	.234**
Self-Rating of Drive to Achieve	.055	.145*	.126*
Self-Rating of Mathematical Ability	.018	.257**	.183**
Self-Confidence in Intellectual Ability	.259**	.043	.105*
Expect to Graduate With Honors	.193	.103	.152**
Expect to Make at Least a B Average in College	.296**	.164*	.217**
ACT Composite Score	.282**	.300**	.309**
Years of High School Mathematics	.028	.246**	.201**

**$p < .01$, *$p < .05$.

Table 3

Summary of Stepwise Multiple Regression Analysis of Psychology Grades Using Cognitive and Noncognitive Variables as Predictors (Both Universities and the Combined Sample)

Step	Variable Entered	Model R-Square	F	p
Institution A				
1	Expect to Make at Least a B Average	.088	9.62	.0025
2	ACT Composite Scores	.138	5.76	.0183
3	Self-Confidence in Intellectual Ability	.156	2.06	.1546
4	Self-Rating of Drive to Achieve	.176	2.34	.1291
5	Self-Rating of Mathematical Ability	.177	0.17	.6768
6	Self-Rating of Overall Academic Ability	.178	0.11	.7378
7	Years of High School Mathematics	.178	0.01	.9182
8	Expect to Graduate With Honors	.178	0.00	.9783
Institution B				
1	ACT Composite Score	.089	22.82	.0001
2	Years of High School Mathematics	.119	7.48	.0067
3	Expect to Make at Least a B Average	.136	4.61	.0329
4	Self-Rating of Mathematical Ability	.143	1.93	.1659
5	Self-Rating of Drive to Achieve	.146	0.82	.3658
6	Self-Confidence in Intellectual Ability	.153	1.75	.1871
7	Expect to Graduate With Honors	.153	0.09	.7619
8	Self-Rating of Overall Academic Ability	.153	0.06	.8135
Combined Sample				
1	ACT Composite Score	.095	35.11	.0001
2	Expect to Make at Least a B Average	.120	9.29	.0025
3	Years of High School Mathematics	.140	7.67	.0059
4	Self-Rating of Overall Academic Ability	.142	0.89	.3453
5	Self-Rating of Drive to Achieve	.143	0.20	.6582
6	Self-Confidence in Intellectual Ability	.143	0.19	.6597
7	Self-Rating of Mathematical Ability	.144	0.09	.7675
8	Expect to Graduate With Honors	.144	0.01	.9073

Table 4

Summary of Stepwise Logistic Regression Analysis of Earning a Satisfactory Grade (A,B,C) vs. an Unsatisfactory Grade (D,F) in Psychology Using Cognitive and Noncognitive Predictors (Both Universities and the Combined Sample)

Step	Variable Entered	Chi-Square	p
University A			
1	Expect to Make at Least a B Average	3.27	.0704
2	Years of High School Mathematics	3.28	.0702
3	ACT Composite Score	2.39	.1220
4	Self-Rating of Mathematical Ability	0.53	.4683
5	Self-Rating of Drive to Achieve	0.43	.5132
6	Self-Confidence in Intellectual Ability	0.52	.4724
7	Self-Rating of Overall Academic Ability	0.15	.6955
8	Exepct to Graduate With Honors	0.01	.9316
University B			
1	Years of High School Mathematics	13.45	.0002
2	ACT Composite Score	3.66	.0556
3	Self-Rating of Overall Academic Ability	1.90	.1683
4	Expect to Make at Least a B Average	0.19	.6637
5	Expect to Graduate With Honors	0.15	.6963
6	Self-Rating of Drive to Achieve	0.08	.7800
7	Self-Rating of Mathematical Ability	0.05	.8290
8	Self-Confidence in Intellectual Ability	0.04	.8462
Combined Sample			
1	ACT Composite Score	10.93	.0009
2	Years of High School Mathematics	2.41	.1207
3	Self-Rating of Overall Academic Ability	1.88	.1702
4	Expect to Make at Least a B Average	0.81	.3684
5	Self-Rating of Mathematical Ability	0.80	.3718
6	Self-Rating of Drive to Achieve	0.60	.4387
7	Self-Confidence in Intellectual Ability	0.23	.6303
8	Expect to Graduate With Honors	0.15	.7002